THE CEREBROSPINAL FLUID IN ANTERIOR POLIOMYELITIS. REPORT ON 108 CASES.*

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DURING the epidemic of anterior poliomyelitis last fall, about 150 cases of this disease were treated at the West Department (contagious) of the Massachusetts Homeopathic Hospital. Of these patients, the majority were subjected to lumbar puncture, and it is the results of the punctures (221 in all) which have furnished the material for the present paper.

All the patients here considered were admitted during the early postparalytic stage. The puncture was performed very shortly after the patient's entrance; many were repeated once or twice, nearly always on consecutive days. In short, we are dealing in this paper with poliomyelitis in the first week or ten days following the onset of the paralytic symptoms.

The following data were obtained on each fluid: pressure, color and appearance, number of cells per cu. mm. (using the Fuchs-Rosenthal chamber), with differential count; globulin content, using (when the amount of fluid permitted) the tests of Nonne and Apelt¹ (the so-called Phase I), Noguchi², and Pandey³. Ninety-four fluids were tested as to reducing power with Fehling's solution (equal parts of spinal fluid and Fehling's solution being brought to the boiling point together). The colloidal gold test of Lange⁴ was applied to 21 fluids. The Wassermann test was not performed⁵. Bloody fluids were not examined.

Pressure. The pressure was increased in 154 cases, or 69.7%, the degree of increase being as follows: Slight increase, 31.7%; moderate increase, 32.6%; marked increase, 5.4%. These findings correspond in general to those reported by others.^{6,7,8}

Appearance. Here, also, results were as expected.^{6,7,8} Only 26 fluids, or 11.7%, were more or less turbid, the rest being clear and colorless. Only one fluid presented fibrin clot formation.^{6,7,8,9}

Cells. In the very earliest stages of the disease (preparalytic), a transient polynucleosis may appear,^{8,9,10} although the frequency of this phenomenon is questioned.⁶ It is generally agreed that immediately after the onset of paralysis, a pleocytosis is demonstrable, and that from 75% to 100% of these cells are lymphocytes. The number of cells varies, as many as 990 per cu. mm. having been reported⁸, but the number, whatever it be, gradually falls, so that

at the end of the second week the cell count is almost always normal⁹. The cells per cu. mm. in this series were as follows: Under 10, 37.4%; 11 to 20, 22.5%; 21 to 50, 23.2%; 51 to 100, 10.3%; over 100, 6.4%. The highest count in this group—which does not include punctures made after intraspinal administration of serum—was 206. With but one or two exceptions, 50% or more of these cells were lymphocytes.

Following the intraspinal treatments,—whether normal or “immune” serum was used,—only 4 out of 56 examinations failed to show an increased cell count. In the majority of these counts, polymorphonuclear cells predominated¹⁰. The highest count in this group was 6500 per cu. mm.—an almost startling figure.

Globulin. It is now generally agreed^{8,9,11} that the globulin excess is comparatively slight in the earlier stages of the disease, gradually increasing during the second and third weeks, and then again subsiding until normality is regained. Whatever course the globulin excess may follow, it certainly is not, as a rule, large at first⁶. In the series now under consideration, only 14 fluids failed to give positive results with the globulin tests applied. In nearly all cases this excess was slight ($\pm$ or $+$). The tests employed yielded fairly consonant results, Pandey's method³ giving a somewhat more marked reaction throughout. This latter statement is illustrated by the fact that, while by Nonne's¹ and Noguchi's², a marked globulin excess was demonstrated in only 1 case, Pandey's test indicated a similar condition in six; Pandey's test has the merit of simplicity and seems to fulfill the claim that it is more delicate than Nonne's. It is a question, indeed, whether it may not be so delicate as to lead to dubious results with normal fluids. In the author's hands, Noguchi's butyric acid test has proved most satisfactory. On account, however, of the very objectionable odor, which is an unavoidable accompaniment of this test, recourse will still probably be had largely to Nonne's method, which is both simple, reliable, and innocent of insult to the Schneiderian membrane.

The degree of globulin excess appears to bear no relation, in the present series at least, to the severity of the disease, the cell count and the pressure of the fluid, or the patient's temperature just before the removal of the fluid.

Fehling reduction. Authors^{8,9,10,11} unite in saying that Fehling's solution is reduced by poliomyelitis fluids in virtually every instance. It is probably only in the cases presenting extensive and severe pathological changes,¹² that this property is lost. The chief significance of this test is in the differential diagnosis of poliomyelitis and meningitis, as in the latter condition a negative result is much more frequent (though far from universal¹³). Of the 93 fluids in this series, examined as to reducing power, all gave a positive result, the reading being in most

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cases + or + + (complete reduction = + + + +).

Lange reaction. Recent studies^{14 15 16} have shown that the spinal fluid of patients suffering from poliomyelitis gives a fairly definite curve when the colloidal gold test is applied. The lower dilutions are reduced, the decolorization rarely, however, being complete. A typical curve in the acute stage¹⁵ is 1 1 2 3 3 3 1 0 0 0. In the later weeks no constant rule is followed¹⁶. The chief value of this test, as of the Fehling reaction, seems to be in aiding to distinguish between poliomyelitis and the meningitides.

Of the 21 Lange reactions here reported, 14, or 66%, follow the general rule laid down in the preceding paragraph. The other curves are so anomalous that some technical error (the nature of which is at present unknown) must be invoked to explain them. Protocols are omitted here, as their presence would not add materially to the value of the paper.

A few words as to the significance of spinal fluid examinations in poliomyelitis may not be amiss. Such physicians (and the number is growing) as place any value upon laboratory reports, tend to rely on them as pathognomonic, neglecting the clinical aspects of disease in so doing. Their diagnosis may be termed reflex; for them the laboratory, instead of being, at the most, a staff to lean upon, has become a sort of mental perambulator. Fortunately or unfortunately, medicine has not yet been reduced to a question of chemical reagents and hemolytic systems; on the other hand, the value of the laboratory to the clinician must not be minimized. The physician who spurns the laboratory is at fault; but he who makes or reads a laboratory report without taking the patient into consideration, commits an even greater error. In poliomyelitis, especially, does this hold true.^{6 17} As we have seen, there is nothing in the chemical or cytological examination of the spinal fluid which can be considered characteristic of this disease. Yet the clinical diagnosis is sometimes far from easy; in such obscure cases the laboratory can aid us in differentiating poliomyelitis from tuberculous or purulent meningitis or meningism. If, first of all, a careful history is taken and a thorough physical examination made, it will frequently be found that the best the laboratory can do is to verify the clinical diagnosis. When this fact is understood and practised, indiscriminate lumbar puncture may cease so to captivate the fancy. In conclusion, the author wishes here to express his thanks to Dr. Helmuth Ulrich, Research Associate of the Evans Memorial, who performed the lumbar punctures and made the cytological examinations.

SUMMARY.

In the early postparalytic stage of anterior poliomyelitis, the spinal fluid usually shows a moderate lymphocytosis and a slight to moderate increase in pressure and in globulin content.

Fehling's solution is reduced, but this phenomenon is of little diagnostic value.

A reasonably constant curve is yielded by Lange's colloidal gold test; this curve has some value in the differential diagnosis.

The picture is only fairly constant, and in the absence of positive clinical findings does not justify a diagnosis.

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Massachusetts Society for Mental Hygiene.

DR. SAMUEL G. HOWE AND THE BEGINNING OF WORK FOR THE FEEBLE-MINDED IN MASSACHUSETTS.*

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BEFORE giving ourselves to the consideration of the papers which have been prepared for this Conference, it is fitting that we should stop for a few moments to pay tribute to the memory of the man who preceded us all in this work, the man who first aroused the interest of the people of Massachusetts in the problem of the feeble-minded, and who laid the foundation upon which we now build the superstructure—the Boston physician-philanthropist, Dr. Samuel G. Howe.

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